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LOUISVILLE UNIV KY DEPT OF PSYCHOLOGY
PERCEPTUAL EVALUATION OF SENSORY INFORMATION.(U)
FEB 63 J R BINFORD

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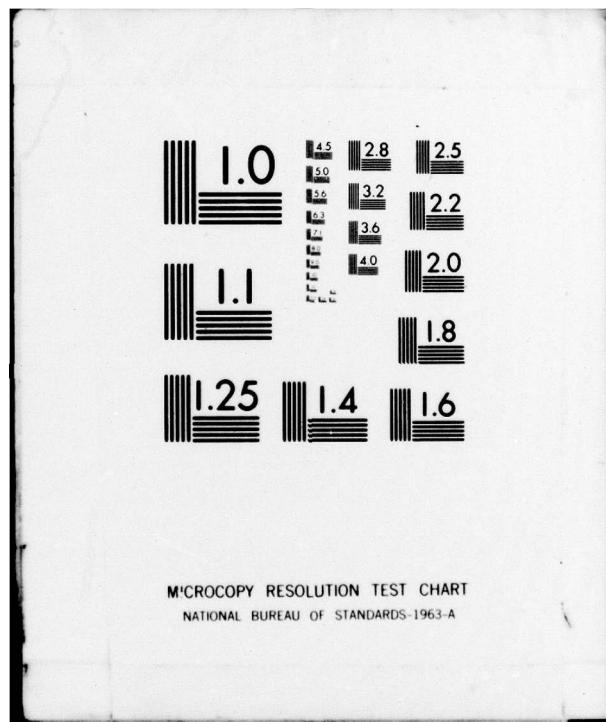
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

OSG

① LEVEL II

Concord, MA
Sens Res Lab

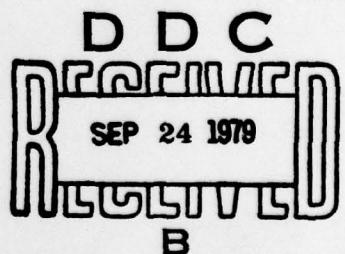
⑨ Semi-Annual Progress Report.

1 September 1962 to 1 February 1963

⑩ John R. Binford Ph.D.
Principal Investigator

⑥ Perceptual Evaluation of Sensory Information, Semi-Annual
Progress Report, 1 September 1962 to 1 February 1963

⑯ Contract # DA-49-193-MD-2197 ✓



⑫ 6p.

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ABSTRACT

1. Preparing Institution: Department of Psychology, University of Louisville, Louisville, Kentucky
2. Title of Report: Progress Report, Perceptual Evaluation of Sensory Information.
3. Principal Investigator: John R. Binford
4. Number of Pages: 5
5. Contract: # DA - 49-193-MD-2197

ABSTRACT

Contract No. DA 49-193-MD-2197 calls for research on the perceptual evaluation of sensory information. There are a number of tasks in progress under this contract:

- (1) Under the direction of Dr. John R. Binford, and Dr. M. Loeb, the investigation of factors determining vigilance;
- (2) Under the direction of Dr. R. P. Smith, and Dr. W. Evans the effects of drugs upon performance;
- (3) Under the direction of Dr. Lee Caldwell, the investigation of force-duration relationships and fatigue;
- (4) Under the direction of Dr. Gene Wist and Dr. George Harker, investigation of temporal factors in stereopsis.

During the past year several studies in related areas have been accomplished using the facilities of the University and the services of personnel employed on the contract: Dr. Loeb and Major Fletcher, On the susceptibility of human subjects to TTS as a function of age and sex, under Dr. Smith and Captain Evans, A Study of the Effect of Morphine and Dexadrine on Mentation and Mood. A study of the effects of gamma radiation on place avoidance learning was completed by Dr. R. P. Smith and Dr. W. Dawson during the summer.

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1. Vigilance

Dr. Binford and Dr. Loeb

A study entitled Arousal and Interference Effects of a Concurrently Performed auditory Task on the Detection of Threshold Visual Signals has been completed.

Each of twenty-four observers was required to detect visual or visual and auditory signals randomly presented during six 80-minute sessions. In one session (C) there were 40 visual and no auditory signals; in a second (A1) there were 40 visual and 20 auditory; in a third (A2) there were 40 visual and 40 auditory; in another (A3) there were 40 visual and 80 auditory signals; in a fifth (A4) there were 20 visual and 20 auditory, and in still another session (A5) there were 20 visual and 60 auditory signals. Order of occurrence of sessions was completely counterbalanced.

The visual signals to be detected were double jumps (approximately 30 degrees) of a clock hand which made one (15 degree) jump per second. Concurrently with performance of the visual task, the subject monitored an auditory channel: to a 60 db continuous noise, .5 sec. 2.1 db increments were added occasionally, these previously having been found to be readily detectable. Progressive decrement on this task is the typical finding.

In this experiment, probability of detection of the visual signals decreased with time on task, but this trend was essentially the same in all sessions. Visual response time was significantly smaller for the control condition (C) than for any condition with auditory signals except that with the largest number of auditory signals (A3). A significant increase in visual response time over the session was found for the control condition (C and for all other conditions except those with the most auditory signals (A3 and A5). This may indicate that the simultaneous monitoring of auditory and visual signals may have mildly distracting and arousing effects and that at higher rates of auditory signal presentation the arousing effects may predominate.

2. Temporal Threshold Shift.

Dr. Loeb and Major Fletcher

An experiment has been completed to determine whether susceptibility to hearing loss varies as a function of age and sex, as has been suggested by some clinical studies. The assumption was made that susceptibility to temporary threshold shift (TTS) is an index of susceptibility to permanent threshold shift. 50 "normal" men and 50 "normal" women divided into 5 equal age groups were exposed to 12 minutes of 112 db (SPL), 1200-2400 cps random noise, and TTS at 2000 and 4000 cps was measured approximately two minutes after the exposure. A significantly greater TTS for women than for men was noted at 2000 cps. Though no general trend with age was observed, the smallest difference in TTS was noted for the youngest groups (those under 30). No significant differences in TTS attributed to age or sex were noted at 4000 cps. Various interpretations of the findings are possible and these will be discussed in an expanded report. The general conclusion will be that no evidence for biological basis for susceptibility as a function of age or sex may be adduced on the basis of data from this investigation.

3. Force-duration relationships on fatigue

Dr. Caldwell

Much of the Spring semester of 1962 was devoted to the construction and calibration of dynamographic equipment, and the development and testing of instructions and procedures. During the latter portion of the semester and during the Summer and Fall semesters of 1962 sixty-four subjects were measured eight times each to determine the relationship between relative (proportional) loading and the endurance of a simple muscle response. Data collection was completed in the Fall semester of 1962, and the draft of the research paper was completed. The final draft of the paper will be completed by the beginning of the Spring semester of 1963.

A second study was initiated during the Fall semester of 1962, 18 male and 18 female subjects being measured on a broad range of relative loads -- from 20% to 95% of maximum strength -- to determine the difference, if any, between the load-endurance functions of males and females. Data collection will be completed early in the Spring semester of 1963 and the final draft of the research paper should be completed by the end of the semester.

4. Temporal factors in Stereopsis

Dr. Wist

Purpose. This project is concerned with the effect of several temporal parameters on the perceived position in space or a stereoscopic visual object. The primary temporal parameter under investigation is interocular delay (IOD) - the time interval between the onset of a brief photic stimulus in one eye and the onset of a similar stimulus in the other eye. An assumption which has been accepted for years is that only when IOD equals zero does stereopsis exist. This assumption, however, has never been adequately tested to date. The interaction of IOD with flash duration and repetition rate (the rate at which pairs of flashes, one to each eye recur) will also be investigated.

Preliminary studies at Army Medical Research Laboratories at Fort Knox have shown that with increasing IOD, the stereoscopic position of the stereoptometer reticle image shifts away from the observer and that IOD interacts with repetition rate. Further investigations at the University of Louisville with 8 paid volunteer observers will attempt to verify this phenomenon as well as evaluate the possible role of eye-movements in producing it. These 8 observers have been selected for their visual capabilities from a total of 45 individuals who were screened. They all possess excellent oculomotor muscle balance, corrected vernier acuities of 20/20 or better, and stereoscopic acuities of 55 sec. arc. or better. All will be available for

from 6 months to 3 years. This last characteristic is quite important since the experimental design requires that each observer receive extensive training in addition to acting as his own control. The University is at present the only source for such observers.

Progress to Date: An L-shaped visual tunnel used in the display of stimuli has been constructed. A stereoptometer has been installed and aligned at the observer's position. A light adaptation screen has been appropriately mounted in proximity to the observer's position. A smaller "within sessions" light adaptation screen is nearing completion, and a device for the measurement of possible eye-movements during IOD has been constructed. A Roush flash generator and associated components has been installed and is now functional.

The observers have all received refractions from a local optometrist. Preliminary training has already begun. A graduate student assistant has been hired and trained for the purpose of running the observers.

5. Effects of morphine and dexadrine on mentation and mood. Dr. Smith and Captain Evans

A study concerning effects of morphine and dexedrine on mentation and mood was carried out with 60 undergraduates as Subjects. Data is currently being analyzed. Two small studies are underway at Medical School Pharmacology Department, one concerning Effect of Amphetamine and the other Chloropromazine on emotionality and motor activity of mice.